

PATENT SPECIFICATION

DRAWINGS ATTACHED

1.124.929



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The Inventor of this invention in the sense of being the actual deviser thereof within the meaning of Section 16 of the Patents Act 1949 is:— PIERRE CHAULIN, 34 Avenue due General Leclerc, Fontenay-aux-Roses, Seine, France, a French citizen.

COMPLETE SPECIFICATION

A Folding Multi-Blade Airscrew

We, NORD-AVIATION SOCIETE NATIONALE DE CONSTRUCTIONS AERONAUTIQUES of 12bis, avenue Bosquet, Paris, Seine, France, a French joint-stock company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to aircraft airscrews.

According to the present invention there is provided a multi-blade airscrew comprising a plurality of hub elements each carrying a pair of oppositely directed blades, all the blades being of the same length and being arranged to rotate in the same direction during flight, said elements being arranged to be locked fast for rotation together during flight with the pairs of blades angularly displaced with respect to one another, one of the hub elements being releasable, when the airscrew is not in motion, to permit relative angular displacement of the hub elements whereby the angular displacement of said pairs of blades can be reduced to zero.

For a better understanding of the invention and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings in which:—

Figure 1 is a diagrammatic front view of an aircraft with two four-bladed airscrews, one of which is shown folded, and

Figure 2 is a diagrammatic perspective view of a four-bladed airscrew such as the airscrews of Figure 1.

The chain-dotted lines A—A, B—B,

[Price 4s. 6d.]

shown in Figure 1 indicate the space a occupied by an aircraft with folding wings 1 and 2, when the wings are folded, the aircraft having a fuselage 6 located between two propulsion units 7 and 8, and resting on three wheels 5 of a three-wheel under carriage. It can be seen that the minimum lateral space occupied by the blades 3 and 4 exceeds by the distance b the reduced dimensions of the span of the aircraft when the wing 1 has been folded back to 1'. However, if the four blades are no longer arranged in the form of a cross about a hub 11, but are superimposed in pairs in the vertical plane, as at 9, on each side of the hub 11, by immobilizing one pair of blades of the airscrew, when the engine is stopped, the total lateral dimensions on the machine is reduced to the space a of the folded back span.

Alternatively by immobilizing the two blades of the airscrew, with the engine stopped, in the horizontal plane, passage under the wings is facilitated, for loading or unloading of freight, for example, or for the movement of passengers. The risk of damage to the airscrew by accidentally fouling the extremities of the blades is also reduced.

In Figure 2 it can be seen how the hub of the airscrew indicated as a whole by reference 11, is in fact essentially composed of two blade-carriers 11a and 11b carrying, respectively, blades 4 and 4a and 3 and 3a. The assemblies 11a, 4, 4a and 11b, 3, 3a in fact form two double blades, the slight displacement of which along the axis of the line of flight does in practice have any influence on the aerodynamic performance of the airscrew.

Unlocking of one of the co-axial half-hubs 11a and 11b with respect to the other can be controlled manually from the pilot's cabin, and thus enables the rotation of one set of blades with respect to the other set of blades to be carried out on the ground, in the direction of the arrows *f1* and *f2*, for example, which has the effect of folding back the four-blade airscrew into the form of a two-blade airscrew.

The locking device may be of any type known *per se*, a clutch with a sliding dog for example, and permits the engagement or the release at will, on the ground, of the coupling between the hubs 11a and 11b, this being effected independently of any mechanism incorporated in the hub, such as a variable-pitch mechanism.

An automatic device may ensure the unlocking of the half-hubs when the motor is cut-off, and their locking in the correct position before starting-up. In particular, any device enabling the relative rotation of the half-hubs to be effected, whilst on the ground, any automatic remote-control circuit for the folding back of the airscrew, any special locking, release and safety devices may be provided.

The above described airscrew also allows for a reduction in the pre-determined dimensions of an aircraft of a type having an engine with a higher power than that of the propulsion units initially provided by the constructor; the use of airscrews having a much greater diameter, correctly adapted to this new engine, does not in fact necessitate any prohibitive modifications to the overall dimensions specified, and the new aircraft, having a higher speed or being capable of carrying a greater load, does not occupy in the hanger on the platform of the lift, more space than the aircraft having the same size of stowage span but with a less powerful engine.

45 WHAT WE CLAIM IS:—

1. A multi-blade airscrew comprising a plurality of hub elements each carrying a pair of oppositely directed blades, all the blades being of the same length and being arranged

to rotate in the same direction during flight, said elements being arranged to be locked fast for rotation together during flight with the pairs of blades angularly displaced with respect to one another, one of the hub elements being releasable, when the airscrew is not in motion, to permit relative angular displacement of the hub elements whereby the angular displacement of said pairs of blades can be reduced to zero.

2. A multi-blade airscrew as claimed in claim 1, wherein when the hub elements are released for relative angular displacement, said pairs of blades are then able to pivot with respect to each other about their common axis in adjacent parallel planes.

3. A multi-blade airscrew as claimed in claim 1 or 2, wherein means are provided whereby, in use, locking or unlocking of the hub elements with respect to each other can be controlled manually from the interior of a pilot's cabin.

4. A multi-blade airscrew as claimed in claim 1, 2 or 3, wherein, in use, an automatic device brings about release of the hub elements when the driving motor of the airscrew shaft is stopped.

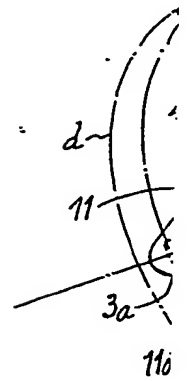
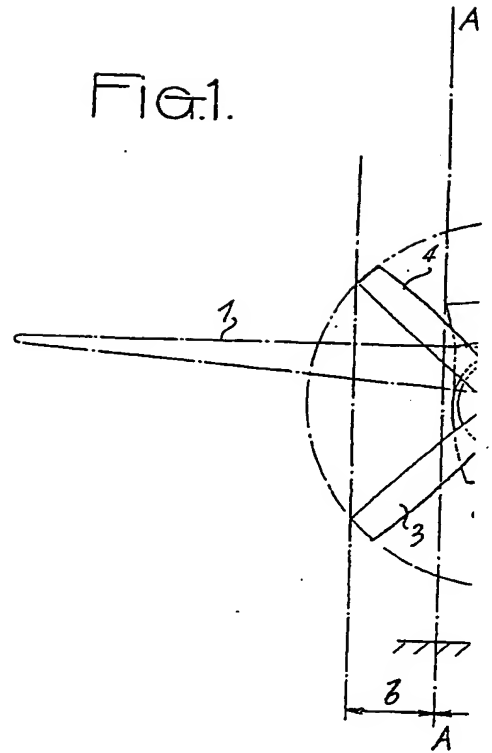
5. A multi-blade airscrew as claimed in any one of claims 1 to 4, wherein, there is provided, in use, an automatic device for ensuring the correct position of the airscrew blades for flight and the locking together of the hub elements to form a single driving means rigidly fixed to the airscrew blades.

6. A multi-blade airscrew as claimed in any one of claims 1 to 5, wherein the airscrew has four blades, and two hub elements the arrangement being such that when the airscrew is not in motion all the blades may be placed in either a horizontal or a vertical position.

7. A multi-blade airscrew, substantially as hereinbefore described with reference to the accompanying drawings.

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Fig. 1.



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COMPLETE SPECIFICATION

1 SHEET

*This drawing is a reproduction of
the Original on a reduced scale*

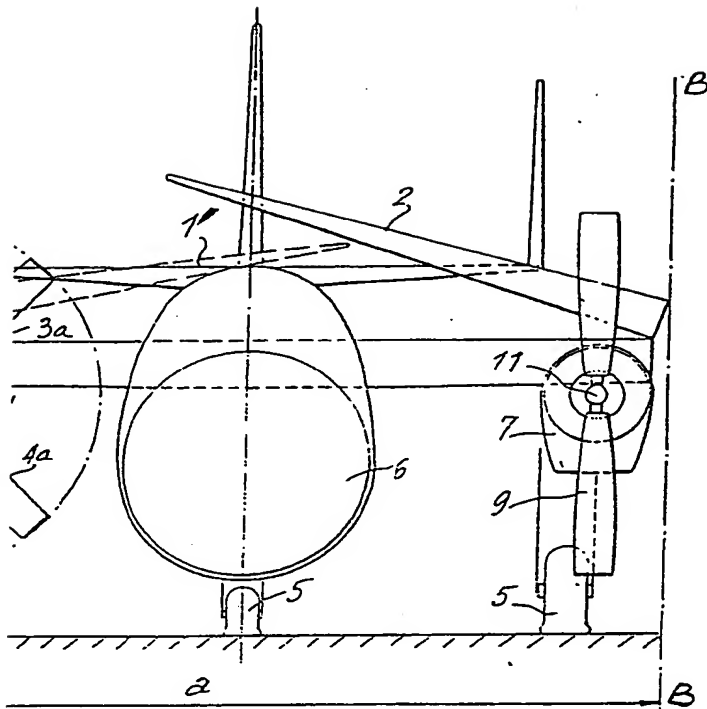
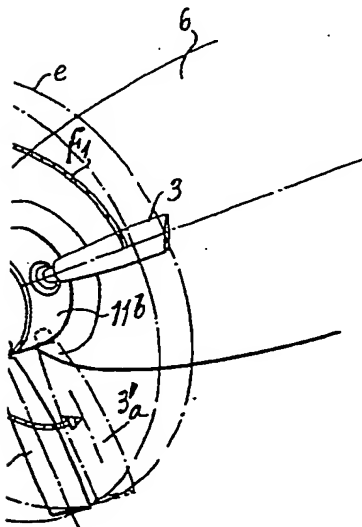


Fig. 2.



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